LISTING OF THE CLAIMS:

Claim 1 (Currently Amended) A method of improving the material quality of a defective semiconductor crystal material comprising the steps of:

amorphizing, partially or completely, a region of a defective semiconductor crystal material to form an amorphized region, said defective semiconductor crystal material comprising a heterostructure containing epitaxial growth-related defects and said amorphized region does not extend to a buried insulating layer within said defective semicondcutor crystal material; and

thermally treating the amorphized region to recrystallize said partially or completely amorphized region forming a recrystallized region that has a reduced defect density, in terms of said epitaxial growth-related defects, as compared to the defective semiconductor crystal material.

Claim 2 (Cancelled)

Claim 3 (Currently Amended) The method of Claim 1 wherein the defective semiconductor crystal material ~~comprising~~ comprises a Si layer formed atop a SiGe alloy layer.

Claim 4 (Original) The method of Claim 3 wherein the Si layer is strained in a tensile manner, and the SiGe alloy layer is partially or completely relaxed.

Claim 5 (Original) The method of Claim 3 wherein the SiGe alloy layer is located atop a Ge resistant diffusion barrier layer.

Claim 6 (Currently Amended) The method of Claim 1 wherein the defective semiconductor crystal material comprises a semiconductor selected from the group consisting of ~~Si,~~ Si, SiGe, SiGeC, SiC, Ge, GaAs, InP, InAs, silicon-on-insulators, and SiGe-on-insulators.

Claim 7 (Currently Amended) The method of Claim 1 wherein said amorphizing is carried out using ~~energetic~~ ions that are capable of forming said amorphized region.

Claim 8 (Currently Amended) The method of Claim 7 wherein said ~~energetic~~ ions are selected from the group consisting of B, Ga, In, C, Si, Ge, N, P, As, Sb, rare gas ions, and any isotope or mixtures thereof.

Claim 9 (Currently Amended) The method of Claim 7 wherein said ~~energetic~~ ions comprise Ge or its isotopes ~~as the energetic ions~~.

Claim 10 (Original) The method of Claim 1 wherein said amorphizing is carried out by ion implantation.

Claim 11 (Original) The method of Claim 10 wherein the defective semiconductor crystal material is maintained at a temperature below 20°C during said ion implantation.

Claim 12 (Original) The method of Claim 1 wherein said amorphizing is carried out by plasma immersion implantation.

Claim 13 (Original) The method of Claim 1 wherein said amorphizing is carried out by a plasma discharge source.

Claim 14 (Original) The method of Claim 13 wherein said plasma discharge source is a radio-frequency or a direct-current plasma discharge source.

Claim 15 (Original) The method of Claim 1 wherein said amorphized region has a depth, as measured from an upper surface of the defective semiconductor crystal material, from about 1 to about 200 nm.

Claim 16 (Original) The method of Claim 1 wherein said amorphizing is performed by ion implantation using an ion dose of about 10^{12} to about 10^{16} atoms/cm^2.

Claim 17 (Original) The method of Claim 1 wherein said step of thermally treating is performed in an inert gas ambient.

Claim 18 (Original) The method of Claim 17 wherein said inert gas comprises He, Ar, N_2, Xe, Kr, Ne or mixtures thereof.

Claim 19 (Original) The method of Claim 17 wherein said inert gas ambient is diluted with an oxygen-containing gas.

Claim 20 (Original) The method of Claim 1 wherein said step of thermally treating is performed at a temperature of about 500°C or greater.

Claim 21 (Original) The method of Claim 1 wherein said step of thermally treating comprises a furnace anneal.

Claim 22 (Original) The method of Claim 21 wherein said furnace anneal is performed at a temperature of about 500°C or greater for a time period of about 15 minutes or greater.

Claim 23 (Original) The method of Claim 1 wherein said step of thermally treating comprises a rapid thermal anneal (RTA).

Claim 24 (Original) The method of Claim 23 wherein said RTA is carried out at a temperature of about 800°C or greater for a time period of about 10 minutes or less.

Claim 25 (Original) The method of Claim 1 wherein the step of thermally treating comprises a spike anneal.

Claim 26 (Original) The method of Claim 25 wherein the spike anneal is performed at a temperature of about 900°C or greater for a time period of about 5 seconds or less.

Claim 27 (Original) The method of Claim 1 wherein the step of thermally treating is performed to a single targeted temperature.

Claim 28 (Original) The method of Claim 1 wherein the step of thermally treating is performed using various ramp and soak cycles.

Claim 29 (Currently Amended) The method of Claim 1 wherein the steps of ~~amophizing~~ amorphizing and thermally treating are repeated any number of times.

Claim 30 (Currently Amended) A method of improving the material quality of a defective semiconductor crystal material comprising the steps of:

introducing ~~energetic~~ ions into a region of a defective semiconductor crystal material to form an ~~amorphous~~ amorphized region within said defective semiconductor crystal material ,said defective semiconductor crystal material comprising a heterostructure containing epitaxial growth-related defects and said amorphized region does not extend to a buried insulating layer within said defective crystal material; and

heating the ~~amorphized~~ defective semiconductor crystal material containing said amorphized region to recrystallize said amorphized region forming a recrystallized region that has a reduced defect density, in terms of said epitaxial growth-related defects, as compared to the defective semiconductor crystal material.

Claim 31 (Currently Amended) A method of improving the material quality of a defective semiconductor crystal material comprising the steps of:

implanting ~~energetic~~ ions into a region of a defective semiconductor crystal material to form an ~~amorphous~~ amorphized region within said defective semiconductor crystal material, said implant is performed at an ion dose from about 10^{12}-10^{16} atoms/cm^2,said defective semiconductor crystal material comprising a heterostructure containing epitaxial growth-related defects and said amorphized region does not extend to a buried insulating layer within said defective crystal material; and

heating the ~~amorphized~~ defective semiconductor crystal material containing the amorphized region to recrystallize said amorphized region forming a recrystallized region that has a reduced defect density, in terms of said epitaxial growth-related defects, as compared to the defective semiconductor crystal material, said heating is performed using a rapid thermal anneal that is carried out a temperature of about 800°C or greater for a time period of about 10 minutes or less.